

CLAIMS

1. A substrate processing apparatus for processing a substrate for manufacturing a semiconductor device, comprising an object to be cooled, the apparatus further comprising:
 - a mist generator that generates a mist;
 - a carrier-gas supply source that supplies a carrier gas for carrying the mist generated in the mist generator; and
 - a mist passage through which the mist carried by the carrier gas flows to cool the object.
2. The substrate processing apparatus according to claim 1, wherein
 - the object is at least a part of a processing vessel in which a substrate received therein is processed.
3. The substrate processing apparatus according to claim 2, wherein
 - the substrate is processed in the processing vessel with the use of a plasma.
4. The substrate processing apparatus according to claim 3, further comprising a heater that heats the object, at least when no plasma is generated.
5. The substrate processing apparatus according to claim 2, further comprising a heating furnace that receives the processing vessel, wherein
 - the mist passage is formed as a space defined between the processing vessel and the furnace.
6. The substrate processing apparatus according to claim 1, further comprising:
 - a temperature sensor that detects a temperature of the object; and
 - a controller that controls the mist generator and the gas

supply source, based on a temperature detected by the temperature sensor.

7. The substrate processing apparatus according to claim 6, wherein

the controller carries out a control operation to stop a generation of the mist by the mist generator and a supply of the carrier gas from the gas supply source, when the detected temperature of the temperature sensor is not more than a reference value.

8. The substrate processing apparatus according to claim 6, wherein

the controller carries out a control operation to stop a generation of the mist by the mist generator, while continuing a supply of the carrier gas from the gas supply source, when the detected temperature of the temperature sensor is not more than a reference value.

9. The substrate processing apparatus according to claim 6, wherein

the controller controls at least one of a flow rate of the mist and a flow rate of the carrier gas in the mist passage.

10. The substrate processing apparatus according to claim 1, further comprising a gas-liquid separator that separates the mist circulated in the mist passage from the carrier gas, and collects the separated mist as a liquid, wherein

the mist generator generates the mist from the liquid collected by the separator.